What is claimed is:

1. An apparatus for controlling a temperature of a substrate, the substrate having a lower surface and an upper surface on which a substrate processing is performed, the apparatus comprising:

a substrate table having a thermal surface supporting the substrate lower surface; and

a first thermal assembly arranged in the substrate table and comprising a plurality of thermoelectric modules, each of the plurality of thermoelectric modules having a thermoelectric surface such that the plurality of thermoelectric modules defines a plurality of thermoelectric surfaces,

wherein:

the plurality of thermoelectric surfaces is in thermal communication with the thermal surface and includes various shapes of thermoelectric surfaces, and

the plurality of thermoelectric surfaces is configured to substantially completely underlie the thermal surface.

2. An apparatus as recited in claim 1, wherein at least one of the plurality of thermoelectric modules is a Peltier module.

3. An apparatus as recited in claim 2, wherein the Peltier module is a multi-stage Peltier module.

4. An apparatus as recited in claim 1, wherein at least two thermoelectric modules of the plurality of thermoelectric modules are arranged such that a space is defined between them.

5. An apparatus as recited in claim 4, wherein a dimension of the space is no more than about 10 mm.

6. An apparatus as recited in claim 4, wherein one or more elements selected from a group consisting of wires for the thermoelectric modules, gas lines, and pins configured to place and remove the substrate is placed in the space between the thermoelectric modules.

7. An apparatus as recited in claim 1, further comprising a power supply providing required voltage and current to the plurality of thermoelectric modules.

8. An apparatus as recited in claim 1, further comprising a temperature sensor constructed and arranged to detect a temperature on the thermal surface.

9. An apparatus as recited in claim 1, wherein the plurality of thermoelectric modules forms a thermoelectric control layer, the thermoelectric control layer having a thickness within a range of a few millimeters.

10. An apparatus as recited in claim 9, wherein the thickness of the thermoelectric control layer is within a range from about 2 to about 9 mm.

11. An apparatus as recited in claim 1, wherein the thermal surface is located within a vacuum process chamber.

12. An apparatus as recited in claim 11, wherein the vacuum process chamber is a plasma process chamber.

13. An apparatus as recited in claim 1, further comprising an electrode arranged in the substrate table and configured to electro-statically clamp the substrate to the thermal surface of the substrate table.

14. An apparatus as recited in claim 1, further comprising a second thermal assembly in thermal communication with the thermal surface.

15. An apparatus as recited in claim 14, wherein the first thermal assembly has a faster thermal response than the second thermal assembly.

16. An apparatus as recited in claim 14, wherein the second thermal assembly comprises a channel that carries a heat-transfer fluid.

17. An apparatus as recited in claim 16, wherein the second thermal assembly comprises a chiller constructed and arranged to control a flow rate and a temperature of the heat-transfer fluid.

18. An apparatus as recited in claim 1, further comprising a gas conduit passing through the substrate table and having a first end open to the thermal surface and a second end opposite the first end such that a gas can flow through said conduit and provide backside pressure to the substrate.

19. An apparatus as recited in claim 1, further comprising an RF power plate arranged in the substrate table and an RF power connector that connects the RF power plate to an RF power supply.

20. An apparatus as recited in claim 1, further comprising a pin constructed and arranged to place and remove the substrate on the thermal surface wherein the pin passes through the first thermal assembly.

21. An apparatus as recited in claim 1, wherein each of the plurality of thermoelectric modules is supplied with separate power.

22. An apparatus as recited in claim 1, wherein groups of the thermoelectric modules are wired together such that separate thermal zones are created within the thermal surface.

23. An apparatus as recited in claim 22, wherein the thermal surface comprises a central, an intermediate and a peripheral zone.

24. An apparatus as recited in claim 1, further comprising at least a heat sink or a heat source in thermal communication with the substrate table.

25. An apparatus as recited in claim 14, wherein the second thermal assembly acts as a heat sink for the first thermal assembly.

26. An apparatus as recited in claim 14, wherein the second thermal assembly is controlled by a fast temperature response apparatus.

27. An apparatus as recited in claim 1, wherein the various shapes of the thermoelectric surfaces include a rectangular shape, a square shape, a polygonal shape, an oval shape, a circular shape, a ring shape or a combination of two or more thereof.

28. An apparatus as recited in claim 1, wherein a distance separating the thermal surface from the plurality of thermoelectric modules is within a range of 1 to 10 mm.

29. An apparatus as recited in claim 1, further comprising mechanical or suction clamps to clamp the substrate.

30. An apparatus as recited in claim 8, further comprising a control unit that adjusts a power supplied to at least one of the plurality of thermoelectric modules on the basis of the temperature detected on the thermal surface.

31. An apparatus as recited in claim 30, wherein the control unit is configured to prevent temperature overshooting during fast heating or fast cooling of the thermal surface.

32. An apparatus as recited in claim 31, wherein during fast heating the temperature of the thermal surface increases quickly and then slowly when the temperature of the thermal surface is substantially close to a desired temperature.

33. An apparatus as recited in claim 32, wherein during fast cooling the temperature of the thermal surface decreases quickly and then slowly when the temperature of the thermal surface is substantially close to a desired temperature.

34. A method of making a substrate table capable of controlling a temperature of a substrate, the substrate having an upper surface and a lower surface supported by a thermal surface of the substrate table, the method comprising:

arranging a plurality of thermoelectric modules in the substrate table, the plurality of thermoelectric modules defining a plurality of thermoelectric surfaces and the plurality of thermoelectric surfaces including various shapes of thermoelectric surfaces.

35. A method as recited in claim 34, wherein the arranging comprises optimizing an arrangement of the plurality of the thermoelectric surfaces such that the plurality of thermal surfaces substantially completely underlies the thermal surface.

36. A method as recited in claim 35, wherein the optimizing comprises selecting the various shapes of thermoelectric surfaces such that the plurality of thermal surfaces substantially completely underlies the thermal surface.

37. A method as recited in claim 34, wherein at least one of the plurality of thermoelectric modules is a Peltier module.

38. A method as recited in claim 37, wherein the Peltier module is a multi-stage Peltier Module.

39. A method of controlling a temperature of a substrate, the substrate having an upper surface and a lower surface supported by a thermal surface of a substrate table, the method comprising:

controlling a temperature of the thermal surface with a plurality of thermoelectric modules, the plurality of thermoelectric modules defining a plurality of thermoelectric surfaces and the plurality of thermoelectric surfaces including various shapes of thermoelectric surfaces.

40. A method as recited in claim 39, further comprising detecting a temperature of at least a portion of the thermal surface with a temperature sensor.

41. A method as recited in claim 39, further comprising controlling the temperature of the thermal surface with a second thermal assembly arranged in the substrate table, the second assembly including a channel that carries a heat-transfer fluid.

42. A method as recited in claim 41, wherein during a heating phase controlling the temperature of the thermal surface with a plurality of thermoelectric modules comprises supplying the plurality of thermoelectric modules with a high positive voltage and controlling the temperature of the thermal surface with a second thermal assembly comprises supplying the channel with a high temperature heat-transfer fluid.

43. A method as recited in claim 41, wherein during a small temperature change in a cooling phase controlling the temperature of the thermal surface with a plurality of thermoelectric modules comprises supplying the plurality of thermoelectric modules with a high negative voltage and controlling the temperature of the thermal surface with a second assembly comprises supplying the channel with a low temperature heat-transfer fluid.

44. A method as recited in claim 41, wherein during a large temperature change in a cooling phase controlling the temperature of the thermal surface with a plurality of thermoelectric modules comprises supplying the plurality of thermoelectric modules with a high negative voltage and controlling the temperature of the thermal surface with a second assembly comprises supplying the channel with a low temperature heat-transfer fluid.

45. A method as recited in claim 41, wherein during a large temperature change in a cooling phase controlling the temperature of the thermal surface with a plurality of thermoelectric modules comprises supplying the plurality of thermoelectric modules with a low negative voltage and controlling the temperature of the thermal surface with a second assembly comprises supplying the channel with a low temperature heat-transfer fluid.

46. A method as recited in claim 39, further comprising providing a gas flow between the thermal surface and the lower surface of the substrate to enhance the control of the temperature of the substrate.

47. A method as recited in claim 39, wherein controlling the temperature of the thermal surface comprises wiring the plurality of thermoelectric modules in separate groups such that separate thermal zones are created within the thermal surface.

48. A method as recited in claim 39, wherein during fast heating or fast cooling of the thermal surface, a power supplied to the plurality of thermoelectric modules is adjusted in order to prevent temperature overshooting.